Dempgraphics

The HM site is incorporated by the city of Lemont, a primarily residential rural community with a population of approximately 4,600 people. Most of the city's residents live in old residential neighborhoods in the city's center, which lies approximately 3 miles southwest of the HM site (Guizzon 1991). In 1980 there were 2,256 persons per square mile in the village of Lemont (US Bureau of Census 1982).

The city of Downer's Grove is a suburban-Chicago center for corporate office space, retail and minor manufacturing that lies approximately 3 miles north of the HM site. Downer's Grove has a population of 45, 858, most fo which resides in relatively new subdivisions north of the city center. In 1980 there were 3,548 persons per square mile in the village of Downer's Grove (US Bureau of Census 1982).

Land Use

The HM site lies in a primarily commercial/industrial and recreational area of unincorporated Lemont. Forested land surrounds the residential areas of Lemont and Downer's Grove and is the most dominant landscape in the site area. Much of the forested land is maintained as forest preserves and parks (USGS maps). Ariculture is limited to only small areas around the site.

The Argonne National Laboratory Reservation is a 1700-acre multidisciplinary research facility which lies approximately 1/2 mile northwest of the HM site. Approximately 50 laboratories and administrative buildings occupy only small portions of the

reservation and the remainder of the property is forested land (Foster 1991).

In the immediate site area in the Des Plaines valley, there are several salvage yards and ongoing commercial construction projects which FIT observed during the site inspection.

Waterway Use

The SSC and the CSC are major waterways for barge traffic between inland industries and Chicago-area ports along Lake Michigan. All types of manufactured products are transported on the barges, but raw materials, such as chemicals, sand and gravel, coal, petroleum products, and grain, are the largest components of the waterway traffic (Wadleigh 1991).

## SECTION 2.4 REGIONAL GEOLOGY AND HYDROGEOLOGY

The regional geology of the HM site is characterized by mildly deformed Paleozoic secimentary rocks which are overlain by uncosolidated Quaternary glaciogenic deposits.

The unconsolidated sediments are almost entirely Wisconsinan in age and represent a varety of glacial environments. Till deposits, primarily morianes, are unsorted and range in texture form dense clay-rich materill to gravel- and sand-rich material (Zeizel, et al 1962, Willman 1971). In DuPage County these deposits are expressed as a series of north-south trending end moraines which record short and rapid fluctuations of the margin of the Michigan Lobe. These moraines are generally assigned to the Valparaiso Moraine, which is a morphostratigraphic subdivision of teh Wedron

Formation (Willman 1971).

Glaciofluvial deposits in the region are generally well-sorted bodies of clay, sand or gravel that are expressed at the surface as kames, kame terraces and eskers. Some of these features are draped along the slopes of more prominent moraine or bedrock topographic highs. Glaciofluvial sediments are also interbedded with till material as lenticular, discontinuous and erratically distributed bodies. Some glaciofluvial material is also found as residual valley train deposits in major drainages that have survived to the present day, such at the Des Plaines valley (Zeizel, et al 1962, Willman 1971).

The major drainage for glacial Lake Chicago is known as the Chicago outlet. This feature, which was active intermittently throughout much of Wisconsian time, eroded through previously existing drift to form the Des Plaines valley, which forms the channel of the present-day Des Plaines River. The erosion of the Chicago outlet was so extensive that bedrock has been exposed along some stretches of the Des Plaines valley (Willman 1971).

Regional bedrock consists of a massive sequence of sedimentary rocks which were deposited in the basin and along the margins of a shallow continental sea (Willman 1971) See Figure 3- for a generalized stratigraphic column of the site area.

Silurian rocks form the bedrock surface throughout most of the region. Composed almost exclusively of dolomite, these rocks are divided into series which are separated ~~which are separated~~ by minor interruption in sedimentation. The younger Niagaran system consists of three formations. The youngest of these, the Racine

Dolomite, is characterized by lare reefs of pure dolomite which are flanked by argillaceous and silty dolomite with lenses of green shale. The Waukesha Dolomite is brownish, slightly silty, fine grained dolomite that occurs in smooth-surfaced beds. The Joliet Dolomite, the basal formation of the Niagaran system in the region, is characterized by interbedded red coarse dolomite and greenish gray argillaceous dolomite with green and red shale partings between the beds, light gray to white cherty dolomite, and mottled pink, vuggy pure dolomite (Willman 1971).

The Alexandrian Series of the Silurian System consists of two formations in the region. The Kankakee Dolomite is composed of gray to pinkish gray or white dolomite. The Edgewood is argillaceous, cherty brownish gray dolomite (Willman 1971).

The Ordovician System in the region comprises 17 formations in 3 series. These formations, from youngest to oldest, are divided into five groups as follows: 1) The Maquoketa Group: Neda Formation (oolitic limestone), Brainard Shale, Fort Atkinson Limestone, Scales Shale. 2) Galena Group: Dunleith and Wise Lake Formations (limestone and dolomite), Guttenberg Formation (dolomite and limestone). 3) Platteville Group: Nachusa Formation (dolomite and limestone), Grand Detour Formation (limestone and dolomite), Mifflin Formation (limestone and dolomite), Pecatonia Dolomite. 4) Ancell Group: Glenwood Formation (sandstone, dolomite and shale), St. Peter Sandstone. 5) Praire du Chien Group: Shakopee Dolomite, New Richmond Sandstone, Oneota Dolomite, and Gunter Sandstone (Willman 1971).

The Cambrian System in the region comprises seven formations.

These formations, from youngest to oldest, are as follows: Eminence Formation (sandy dolomite), Potosi (Trempeleau) Dolomite, Franconia Formation (dolomite), Ironton Sandstone, Galesville Sandstone, Eau Claire Formaion (sandstone), and Mt. Simon Sandstone (Willman 1971).

The bedrocks in the region of the HM site lie along the northeastern flank of the Kankakee Arch. This broad, northwest-southeast trending asymmetrical anticline is a northwestern extension of the Cincinnati Arch and separates the Michigan and Illinois basins. Dip of the bedrock is less than one degree east and southeast.

Hydrogeology

The groundwater system in the region of the HM site consists of six basic geohydrologic units: glacial drift aquifers, Silurian dolomite aquifer, leaky confining beds of the Maquoketa Group, Cambrian-Ordovician aquifer, confining beds of the Eau Claire Formation, and the Mt. Simon aquifer.

Sand and gravel of the surficial glacial deposits comprise the Prairie Aquigroup. This aquifer is poorly distributed in the region. Wells which draw from the Prairie Aquigroup in Du Page County range in depth from 61-136 feet and produce 20-750 gallons per minute (gpm) (Woller, et al 1986, Zeizel, et al 1962).

Silurian dolomite in the region comprises the shallow Upper Bedrock Aquigroup. Zones of saturation exist primarily in joints and fractures in the eroded surface of the Niagaran Series that have been enlarged by solutioning. Wells which draw from the

shallow Upper Bedrock Aquigroup in Du Page County range in depth from 75-425 feet and produce from 200-2,500 gpm (Woller, et al 1986, Zeizel, et al 1962).

Relatively impermeable shale beds of the Maquoketa Group underlie the Silurian dolomite. These beds allow leakage from the Silurian dolomites into the underlying units (Woller, et al 1986, Zeizel, et al 1962).

The Cambrian-Ordovician, or the Midwest Aquigroup, underlis the Maquoketa Group. Small yields are obtained from joints and fractures in the Galena and Platteville Groups and the Prairie du Chien and from poorly indurated zones of the Glenwood and St. Peter sandstones. The main producing formations of this aquifer are the Ironton and Galesville sandstones, which are consistently permeable, clean and friable. Wells in Du Page County which draw from the Midwest Aquigroup range in depth from 1356-1630 feet and yield 500-1350 gpm (Woller, et al 1986, Zeizel, et al 1962).

The Eau Claire Formation, which underlies the Ironton and Galesville sandstones, acts as a relatively impermeable confining layer that maintains head pressure between the Midwest Aquigroup and the underlying aquifer (Woller, et al 1986, Zeizel, et al 1962).

The deepest aquifer in the region is the Mt. Simon Formation, which comprises the Basal Bedrock Aquigroup. This aquifer is generally salty and of poor quality. Wells in Du Page County which draw from this aquifer range in depth from 1793-2062 feet and produce 750-1,000 gpm (Woller, et al 1986, Zeizel, et al 1962).

Regional groundwater flow in the shallow bedrock aquifer is

toward the Des Plaines River, as determined during the Groundwater Pathway Assessment.

## Section 2.3 REGIONAL GEOGRAPHY

### Physiography

The area around the HM site is comprised by the Wheaton Morainal Country of the Great Lakes Section of the Central Lowland Province. The HM site lies near the western edge of the Wheaton Morainal country in a flat, low-lying valley, created by an outlet from glacial Lake Chicago. This valley is now part of the channel of the present-day Des Plaines River (Willman 1971). The 97-acre site property is located on a point of land near the confluence of the man-made Chicago Sanitary and Ship Canal (SSC) and the Calumet Sag Channel (CSC). The site lies at an elevation of approximately 600 feet above mean sea level (MSL) and, as a result of extensive engineering of the surrounding waterways, is generally flat (SSIR).

Hills which rise above the valley represent the effects of continental glaciation and were formed as kames, kame terraces, eskers and end moraines. In some places near the site, portions of Silurian reefs protrude through this glacial cover. The present-day topography of the surrounding hills has resulted from dissection of the glacial features by existing streams and rivers (Willman 1971).

The HM site lies near the major drainage divide that separates waters that flow to the Gulf of St. Lawrence through the Great Lakes and those that flow to the Gulf of Mexico through the Illinois and Mississippi Rivers (Willman 1971). The Des Plaines River, which flows southwest, drains the southeastern portion of Du Page County. Much of Cook County was formerly drained toward Lake

Michigan through the Chicago and Calumet Rivers. Construction of locks along these rivers, however, has reversed their flows, and they now flow into the Des Plaines River through the SSC and CSC. The Des Plaines River, therefore, is now the major drainage for Du Page and Cook counties. Some areas near the site, such as sloughs, bogs and kettles, are essentially undrained (USDA 1979).

Principle soils in the site area are mapped as Romeo silt loam, which consists of an approximately 5-inch layer of loam overlying carbonate bedrock, and the Orthents stony. The Orthents stony consists of stones and boulders, which have been dredged from the underlying carbonate regolith or blasted from the bedrock during construction of nearby waterways.

Climate

The climate in the area of the site is temperate cold and dry in the winter and hot and humid in the summer. The mean temperature is 21.1 F in January and 72.2 F in July. The mean annual precipitation, which is well-distributed throughout the year, is 33.42 inches. The average seasonal snowfall is 38.3 inches. The lowest montlhly precipitation of 1.24 inches occurs in February, and the highest, 4.03 inches (check) occurs in June. These data, which reflect conditons in Chicago, were prepared by the National Climatic Center in Asheville, North Carolina, for the Soil Conservation Service (USDA 1979). Prevailing winds for the area westerly at 11 miles per hours in January and southwesterly at 8 miles per hour in July (US Deparment of Commerce 1979).

2.3 SITE HISTORY

The Hannah Marine site is located on property owned by the Metropolitan Water Reclamation District (MWRD) (Barnas 1989). Until 1990, the MWRD was named the Metropolitan Sanitary District (MSD) (Sustich 1991). The site is an active facility that began operations in 1951 (Barnas 1989). Site operations are unknown before 1951, although it is presumed that the property was undeveloped prior to this time. The Hannah Marine Corporation leases the property from the MWRD (Barnas 1989).

The Hannah Marine facility functions primarily as a transporter by barge of bulk liquid chemicals and petroleum products (Wiggins 1984). The Hannah Marine facility also serves as a river barge cleaning and repair yard (Wiggins 1984; E & E 1986). In its cleaning operations, Hannah Marine vacuums storage compartments of barges to remove the remaining chemical products (E & E 1986). Occasionally, the storage compartments are steam cleaned with a detergent to remove residues on the walls and floor. The amount of waste water and sludge generated from the cleaning of a single barge varies from 9,000 to 15,000 gallons, with approximately 90 to 120 barges being cleaned per year (E & E 1986).

During the period from 1951 to 1958, wastes generated from the cleaning operations was discharged directly into the shipping canal (E & E 1986). This method of disposal was discontinued in 1958 at the insistence of the MSD. In late 1958, two unlined

retention lagoons were constructed on-site to store the cleaning wastes. The lagoons were used until 1978, at which time the MSD insisted that the lagoons be filled. At this time, the MSD constructed two ground water sampling sumps adjacent to the abandoned lagoons (E & E 1986).

In November of 1979, The MSD prepared a sixty day eviction notice to be served to Hannah Marine unless it complied with specific provisions prepared by the MSD (Schroeder 1979). The provisions stipulated that Hannah Marine must obtain a proper holding tank for liquid wastes, dike the liquid wastes present in the lagoons on-site, and comply with demands made by the Illinois EPA (IEPA) for clean-up procedures and future handling of wastes (Schroeder 1979).

On November 16, 1979, the MSD, U.S. EPA, and IEPA met with Hannah Marine to discuss the progress of clean-up procedures at the site (Schroeder 1979). During the discussion, it was determined that approximately 5,000 gallons of waste water from the lagoons had been pumped out and landfilled at Winthrop Harbor. Also, the on-site lagoons had been diked as the MSD had requested (Schroeder 1979).

In November of 1980, Hannah Marine filed an application for a U.S. EPA Hazardous Waste Permit needed as a generator of hazardous waste (U.S. EPA 1980). With the application, Hannah Marine supplied a diagram of the facility showing a tank labeled "waste oil" and another tank labeled "contaminated water". These tanks were located in the diked area where the lagoons had once been (U.S. EPA 1980). The exact date of their placement on-site

is unknown, but apparently the tanks had been placed there for waste storage after the lagoons were diked and filled.

On April 9, 1982, a representative from the IEPA conducted an inspection of the Hannah Marine site to determine compliance with the Resource Conservation and Recovery Act (RCRA) (Bechely 1982). During the inspection, several deficiencies in compliance with RCRA were noticed. The deficiencies included no chemical and physical analysis of stored wastes; a lack of detailed information the description and quantity of each type of waste generated; and lack of information on the subsequent treatment, storage, and disposal of waste. Hannah Marine was ordered by IEPA to rectify the deficiencies or face possible enforcement action by the U.S. EPA (Bechely 1982). Hannah Marine complied with the IEPA request in July of 1982 by supplying the agency with the appropriate documentation (Lambert 1982).

Lack of information concerning the clean-up procedures as a follow-up to the removal of the lagoons prompted the IEPA to perform a Potential Hazardous Waste Site Preliminary Assessment (PA) on March 29, 1984 (E & E 1991). As a result of the findings of the PA, U.S. EPA FIT conducted a Screening Site Inspection (SSI) at the Hannah Marine site (E & E 1986). The SSI, conducted on May 8, 1985, included a general reconnaissance inspecting as well as the collection of three on-site ground water samples, three sediment samples, and one waste water sample from an above ground storage tank (E & E 1986). During the time of the SSI, FIT noted that the material vacuumed from barges was stored separately from the washing waste water. The vacuumed material

was stored in an above ground tank farm near the sites main building, while the waste water was stored in the tank in the area of the abandoned lagoons. The contents of the waste storage tanks were being shipped to the Chem Clean Company in East Chicago, Indiana, for disposal. The shipping of the wastes would occur two to three times a year. FIT also noticed that the diking around the waste water tanks was in poor condition and diking around the chemical storage tanks was absent (E & E 1986). The results of the FIT-collected on-site samples indicated the presence of several TCL compounds including chloromethane (118.7 mg/kg), vinyl chloride (296 ug/L), chloroethane (271 ug/L), 1,1-dichloroethane (1,360 ug/L), 1,1,1-trichloroethane (1,090 ug/L), and toluene (172,264 mg/kg) (E & E 1986).

On July 17, 1987, IEPA conducted a RCRA site inspection at the Hannah Marine site (IEPA 1987). During the inspection, IEPA noted several apparent violations including improper labeling of hazardous waste storage tanks, inadequate contents for an emergency contingency plan, and the lack of a description in the 1986 annual report about efforts to reduce the volume and toxicity of wastes generated. Hannah Marine Corporation was informed by IEPA of the violations on August 31, 1987, and given 15 days to respond (Kissinger 1987). Hannah Marine responded in September of 1987 by providing the information that IEPA had requested (Rosemarin 1987). Consequently, upon reviewing the information provided by Hannah Marine, the IEPA determined that the previous violations had been resolved (Chappel 1987).

In 1990, a construction crew, contracted by the MWRD, was

excavating a pit near the site for a water diversion system (Kelley 1991). The pit was located approximately 75 feet north of the Calumet Sag Channel and west of the junction of Archer Avenue and State Route 83. The construction crew noticed a heavy oil, presumed to be #5 or #6, coming to the surface from the pit. The construction crew performed a leachate test and determined that the oil was non-hazardous. They removed the oil and proceeded with the construction. Frank Kelley, an engineer from Industrial Waste, Inc., also collected a sample of the waste. Industrial Waste, Inc. owns part of the Hannah Marine site (Sustich 1991a). The results of the analysis of the sample collected by Kelley is unknown. Kelley alleges that the oil came from the Hannah Marine site (Kelley 1991).

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